IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Manfred Heisler et al.

Group Art Unit: 1723

Examiner: David L. Sorkin

Serial No.: 10/802,455

Filed: March 17, 2004

For: PROCESS FOR THE CONTINUOUS PREPARATION OF HIGH-VISCOSITY SILICONE COMPOSITIONS

Attorney Docket No.: WAS 0627 PUS

REPLY BRIEF UNDER 37 C.F.R. § 41.41

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants hereby reply to the Examiner's Answer dated October 12, 2007.

The principle issue is whether the *Mathur* and *Schuster* references are combinable, and if so, whether their combination teaches or suggests the claimed invention.

Appellants' invention is directed to an improvement in crosslinkable silicone composition preparation wherein the ingredients are first fed to a kneading cascade where product flows to subsequent stages transverse to the axis of the kneading elements, followed by a reciprocating kneader which also degasses the composition. Appellants have shown by their Example and Comparative Examples, that their process provides products with far superior properties in terms of storage stability, % volatiles, and freedom from discoloration.

Mathur teaches use of a twin screw extruder followed by a single shaft reciprocating extruder to mix silicone components. The crux of *Mathur's* invention is the avoidance of the use of pretreated filler, which, as indicated at columns 1 and 2 cause problems. *See, e.g. Mathur* at [0004] - [0007], which describes the prior art, not *Mathur's* invention. As stated in [0008]:

> The invention provides a process that utilizes untreated filler that has extended use properties.

See also [0012]:

> According to the invention, high viscosity heat-vulcanizable silicone compositions are prepared directly from untreated premix. Untreated premix is a compounded mixture of a filler with silanol surface groups that have not been reacted with a treating agent and a high viscosity silicone polymer. Surprisingly, silanol groups of the silica of the premix can be adequately treated with treating agent during a subsequent compounding step with polymer gum in a high speed mixer or extruder.

See also [0020]:

> The treating agent can be added in the compounding step in a weight proportion of about 0:1 to about 100 parts fluid to 100 parts of filler, desirably about 0.5 to about 75 parts fluid to 100 parts of filler and preferably about 1.0 to about 50 parts fluid to 100 parts of filler. The treating agent can react to reduce available groups of the filler to a concentration of between about 8 to about 2 hydroxyl groups /(nanometer)2 of filler, preferably between about 7 to about 3 hydroxyl groups/(nanometer)2 of filler. In an embodiment, the treating agent can be a combination of HMDZ and water. This combination can comprise a weight ratio of IIMDZ/water of between about 1/0.1 to about 1/10 or between about 1/0.5 and about 1/5 or between about 1/1 and about ⅓.

Therefore, it is clear that *Mathur's* invention avoids use of pretreated, hydrophobicized silica. Rather, hydrophilic silica with substantial surface silanol groups[1] are used in *Mathur*. *Mathur* decreases the surface silanol content during his process (i.e. *in situ*), to "reduce" the surface silanol content to between 8 and 2 $SiOH/nm^2$, preferably between 7 and 3 $SiOH/nm^2$. Thus, ¶[0004] cited by the Office in the Answer is NOT directed to *Mathur's* invention, but is what *Mathur* teaches away from. By the same token, Example 2 employs a pretreated filler (*Mathur* does not say with what the silica is pretreated with), and therefore must be a comparative example, if the silica is treated to be prehydrophobicized, since the entire aim of *Mathur* is to use untreated silica and reduce silanol content *in situ*.

Schuster teaches use of a kneading cascade and teaches against the use of either a twin screw extruder or reciprocating kneader. *See Schuster* at column 1, lines 29 - 45:

> The above-described screw reactors, i.e. oscillating reciprocating compounder and twin-screw extruder do not permit sufficiently intensive kneading of the silicone compositions, since the insufficiently long residence time of the compositions in the reactor chamber can be varied only to a minor extent. Even if the throughput is reduced, the residence time hardly changes, since the screws have a constant delivery. If the rotational speed is reduced, it is possible to slightly extend the residence time, but this is offset by less effective kneading.

Moreover, *Schuster* teaches the use of hydrophobic, pretreated silica, just what *Mathur* teaches against. *See, e.g. Schuster* column 2, lines 30 - 35:

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[1] Hydrophilicity of silica is due primarily to surface silanol groups, ≡Si-OH which can hydrogen bond with water, and in the case of siloxanes, also hydrogen bonds with the siloxy group oxygen atoms. Hydrophobic silica has been treated to react silanol groups away, so the surface silanol content is non-existent or very low, e.g. 0 - 0.5 $SiOH/nm^2$.

> The present invention relates to a process for preparing storage-stable organopolysiloxane compositions in which organopolysiloxanes and prehydrophobicized oxidic reinforcing fillers are blended and kneaded in a kneading machine comprising kneading chambers which are arranged in series next to one another.

How can these references be combined? *Mathur* requires a twin screw extruder. This is clear not only from his specification, but also from his claims. *See, e.g.* claim 1:

> . . . mixing filler and high viscosity silicone polymer continuously in a first co-rotating intermeshing twin screw extruder . . . .

Any combination of *Mathur* and *Schuster* must include a twin screw extruder. That is *Mathur's* invention. There is no room for substitution of a required element by another. The salient features of a combined reference must be retained in any combination of references. *In re Wesslau*, 353 F.2d 238, 147 USPQ 391 (CCPA 1965).

Schuster teaches avoiding both twin screw kneaders and reciprocating kneaders. *Schuster* teaches use of a kneading cascade instead. There is no motivation to replace the twin screw kneader of *Mathur*, which he uses to mix in and treat silica *in situ*, with a reciprocating kneader which is useful with prehydrophobicized silica. Moreover, the proposed combination would include a reciprocating kneader, just what *Schuster* teaches to avoid. Even if, *arguendo*, one were motivated to replace the twin screw extruder with the cascade kneader of *Schuster*, one would also be motivated to eliminate the reciprocating kneader of *Mathur*, since *Schuster* teaches against the use of such devices, and teaches that a kneading cascade alone is sufficient. This is not a case such as that in *KSR International Co. v. Teleflex Inc.*, 200 U.S. 321, 82 USPQ 2d 1385 (2007), where one known component from a select few is substituted for another with expected results. Rather, there are many, many mixing devices available, not just

twin screw extruders or kneading cascades. There are, for example, Banbury mixers, Henschel mixers, rotor/stator mixers, sigma blade mixers, three roll mills, rubber mills, dough mixers, and single and twin screw mixers of innumerable screw and barrel geometries and rotations (conrotating, counter-rotating). Moreover, while the expected result of using a combination of mixers might be more thorough mixing, Appellants have surprisingly discovered that by their unique combination, storage stability is increased, volatiles are decreased, and color is decreased. If anything, one would expect discoloration to be exacerbated through the use of more mixing apparatuses, due to more contact of the abrasive filler-containing mixture with metal rotating parts. However, this is not the case. This result is clearly unexpected.

Summary

There is no motivation to combine *Mathur* and *Schuster*. Moreover, even if combined, any combination would have to include the salient feature of a twin screw extruder of *Mathur*, and would have to avoid the use of reciprocating kneader as taught by *Schuster*. Applicants have combined their mixing elements in an inventive manner, a manner neither taught nor suggested by the art, and as a result have achieved surprising and unexpected benefits. All rejections of record should be reversed.

Respectfully submitted,
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